

Attorney Docket No: P-5098

RemarksStatus of the Claims

Claims 1-3, 5-7, 11-20, 22-24, and 28-54 are pending.

Claims 11-17 and 28-34 are withdrawn from consideration.

Claims 1-3, 5-7, 18-20, 22-24, and 35-54 are rejected.

Amendments to the Claims

Applicants have amended independent claim 35 to clarify that the first and second signals from which the sampling device receives portions are the first and second signals, generated by the first and second detectors, representative of the light emitted from the event. The amendment does not introduce new matter.

The amendments to claim 35 make the language consistent with the language of the other independent claims, claims 1, 18, and 45, in which the signal from which portions are sampled is clearly identified as the signal representative of the event. Thus, the amendment does raise any new issues, but only serves to clarify that the arguments present previously and herein unambiguously apply equally to claim 35 as well as to claims 1, 18, and 45.

Applicants request entry of the amendments to the claims into the record.

The Rejection of Claims 35-39, 44, 45-49, and 53 Under 35 U.S.C. §102

Claims 35-39, 44, 45-49, and 53 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,150,313 ("the '313 patent"). More specifically, Examiner cited the parallel pulse processing circuitry shown in Fig. 5A and described at column 8 of the '313 patent. Applicants traverse for the reasons set forth below, in addition to the reasons of record.

The present rejection represents a restatement of the rejection set forth in the previous Office action. Applicants responded to the previous Office action by showing that the claimed invention is distinguished from the teachings of the '313 patent at least in the manner of processing a signal corresponding to the light emitted from a particle or cell as it passes the detector (i.e., an event). The claimed invention specifies digitizing

Attorney Docket No: P-5098

portions of the signal from a single event, in real time and in time sequence. In contrast, the '313 patent teaches obtaining only a single value representative the entire signal from an event, and digitizing this single value.

However, Examiner maintained the previous rejection based on an interpretation of the claims that ignored the claim limitations regarding the digitization of multiple portions of the signal corresponding to an event, stating:

However, the rejections of last Office action are based on that the first (or second) signal having many pulses continuously coming from the first (or second) detector is converted to many digital signals by continuously sampling at specified times, i.e., a first portion of the first (or second) signal during first time frame generates a first digital value, a second portion of the first (or second) signal during second time frame generates a second digital value, etc. Examiner does not agree with Applicant's assumption that a signal is a pulse, and considers a signal as comprised of many pulses.

Office action page 9-10. Applicants respectfully point out that Examiner's interpretation of the claimed invention ignores the limitations of the claims and is in error. Below, Applicants discuss the limitations of the independent claims, claims 35 and 45, in view of the teachings of the '313 patent, and show that (1) the claim language clearly focuses on the processing of a signal representative of an event (i.e., a single signal pulse as a particle or cell passes the detector) and (2) the claimed invention is neither taught nor suggested by the cited prior art.

Claim 35 (and, thus, dependent claims 36-39 and 44) is drawn to a system for processing at least two signals representative of an event. The system comprises two detectors, each adapted to detect and generate a signal representative of the light emitted from the event, and a sampling device adapted to digitize portions of each of the two signals representative of the light emitted from the single event as each portion is being received. Thus, the claim language specifies that one element of the claim is that the system digitizes, in real-time, portions of each signal representative of the light emitted from a the passage of a particle or cell by the detector, as the signal is received.

Similarly, Claim 45 (and, thus, dependent claims 46-49 and 53) is drawn to a method for processing at least two signals representative of an event. The method comprises detecting and generating, using two detectors, a first signal and a second signal representative of the light emitted, and receiving and digitizing portions of each of the

Attorney Docket No: P-5098

two signals representative of the light emitted from the single event as each portion is being received. Thus, the language of claim 45 specifies that one element of the claimed invention is that the method involves digitizing, in real-time, portions of each signal representative of the light emitted from a the passage of a particle or cell by the detector, as the signal is received.

In contrast, the '313 patent describes a parallel pulse-processing system for a flow cytometer in which each signal pulse is processed in a manner that is fundamentally different from that in the claimed invention. As used in the '313 patent, a pulse refers to the signal pulse from the fluorescent light emitted by a single particle (see, for example, column 1). In the pulse-processing system of the '313 patent, a single discrete analog value representing a characteristic of each signal pulse (such as the height, area, or width) is converted into a discrete digital value representing the same characteristic. Referring to Fig. 5A of the '313 patent, three detectors (20a, 20b, and 20c) are illustrated, each connected to a respective input channel (21a, 21b, and 21c). Each input channel consists of a pulse sample/hold (PSH) circuit (22a, 22b, and 22c), an analog-to-digital converter or ADC (23a, 23b, and 23c) and a first-in, first-out (FIFO) buffer (24a, 24b, and 24c), all connected in series. A central timing unit (25), comprising a threshold-type analog trigger unit (28) and a digital delay line (29), synchronizes the timing of the pulse digitization process by detecting an event on the first channel (21a) and then triggering the PSH circuits of all three channels in the proper sequence.

In the circuitry of Fig. 5A of the '313 patent, pulse digitization is carried out by the combination of the PSH circuit (22a, 22b and 22c) and the ADC (23a, 23b, and 23c) in each channel. The function of the PSH and ADC in pulse digitization are described at column 5, lines 51 through 58 of the '313 patent:

In the processing system of the invention, the pulse digitization has been divided into two steps that are carried out by separate circuits. An externally gated analog pulse sample/hold circuit (PSH) translates pulse size (the height, area or width of an input pulse) into a voltage (Fig. 2B). This voltage is accepted by a track/hold circuit at the input of an analog-to-digital converter (ADC).

Thus, the '313 patent teaches, for each of possibly multiple detectors, processing the signal representative of the light emitted from a particle or cell as it passes the detector (i.e., an event) using a PSH circuit to produce a discrete analog value representing the

Attorney Docket No: P-5098

entire signal pulse from the event, and then digitizing this single analog value. The '313 patent fails to teach or suggest digitizing, in real time, portions of each signal representative of the light emitted from a particle or cell as it passes the detector, as the signal is received.

In summary, the claimed invention is fundamentally different from the parallel pulse-processing system taught by the '313 patent. The present invention allows digitizing, in real time, portions of the entire waveform of the signal from a single event in time sequence. In contrast, the '313 patent teaches obtaining only a single analog value representative of the entire signal from an event, and then digitizing the single analog value. As the '313 patent fails to teach at least this critical element of the claimed invention, the '313 patent fails to anticipate the claimed invention.

Applicants request reconsideration and withdrawal of the rejection of claims 35-39, 44, 45-49, and 53 under 35 U.S.C. §102(b) in view of the above remarks.

The Rejection of Claims 1-3, 5-7, 18-20, 22-24, 40-43, and 50-52 Under 35 U.S.C. §103

Claims 1-3, 5-7, 18-20, 22-24, 40-43, and 50-52 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,150,313 ("the '313 patent") in view of Bierhoff (U.S. Patent No. 4,813,031 ("the '031 patent") (Office action §5). Applicants traverse for the reasons set forth below.

The critical teaching of the '313 patent is summarized in the previous section regarding the rejection of claims 35-39, 44, 45-49, and 53 under 35 U.S.C. §102(b). Examiner cited the secondary reference, the '031 patent, as teaching "arithmetically combining a designated value (a bar) with each of said values" (Office action, page 3, lines 11-12). Applicants show below that the teachings of the '313 and '031 patent, alone or in combination, fail to teach or suggest the claimed invention.

Claims 1-3, 5-7, 18-20, 22-24, 40-43, and 50-52 are drawn to a signal-processing system for a flow cytometer and method of use in which portions of each detector signal corresponding to a single event are digitized in real time and in time sequence. The language of the independent claims, claims 1 and 18, closely parallels the language of claims 35 and 45, discussed above. In addition, claims 50-52 depend from method claim

Attorney Docket No: P-5098

45, discussed above. Applicant respectfully request that Examiner review the analogous language in claims 1 and 18 in view of the more detailed discussion provided above.

As discussed in the previous section, the '313 patent fails to teach or suggest digitizing, in real time, portions of each signal representative of the light emitted from a particle or cell as it passes the detector, as the signal is received. The additional teaching of the '031 patent of arithmetically combining a designated value with the value obtained after pulse-processing does nothing to make up for the failure of the '313 patent to teach or suggest the distinct signal-processing of the claimed invention. The combined teachings of the '313 and '031 patent, alone or in combination thus fail to teach or suggest the claimed invention.

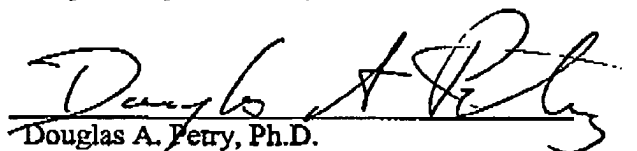
Applicants request reconsideration and withdrawal of the rejection of claims 1-3, 5-7, 18-20, 22-24, 40-43, and 50-52 under 35 U.S.C. §103 in view of the above remarks.

Conclusion

Applicants respectfully submit that all rejections have been traversed or rebutted and that the application is in condition for allowance. Applicants respectfully request that all pending claims be allowed.

Respectfully submitted,

3/30/04
Date


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